Page 497

The only data that exists, as he showed you, was in Montana and Bismarck twice a day, two data points at each place. What he has provided to you is an enormous amount of data that shows the winds at literally hundreds of thousands of points at several levels in the atmosphere and provides a far superior basis for modeling.

When you use that modeling, you get compliance even with the Class I increment, even using EPA's emission inventory. Forget about their criticism of not using their standard method for new source review. Take it for granted, put it in and run it into the model and you get compliance. The only thing we've left out is variant sources. And variant sources, I submit to you, should not be included in using Class I increment.

If you take into account increment expanders in addition to the results that have already been given to you by Mr. Paine, I think you'll find that you're well within the Class I increment, much less within the levels that have been demonstrated not to adversely affect air quality related values. As you've heard, that 12.7 that you're below -- we're below back in 1993, and we're probably better now, indeed the data shows

Page 498

it, in the North and South Unit, those levels are below the levels that those models are usually allowed to use for background elsewhere in the country. So I think the State's judgment on significant deterioration based on the record in this case as it exists now would not be arbitrary and capricious, would be entirely reasonable.

I did not mention last time that EPA has recently in briefs addressed exactly the standard it would apply to a state PSD determination. I think I alluded to that in general, but their latest brief filed on this subject says that EPA has to show that a state is arbitrary or capricious if it is going to take any action against a state.

In this case I would submit to you that if EPA proceeds based on its own modeling, it, itself, would be arbitrary and capricious. It simply doesn't include the things that you have to include, much less weigh the monitoring of other data.

So with that I will thank you very much for giving us so much time and attention and asking such wonderful questions and doing such what I regard as amazing work in trying to do this job.

MR. SCHWINDT: Thank you. Any questions

Page 499

of Mr. Connery? If not, thank you.

MR. GREEN: Mr. C., I won't be as harsh on you. You are a licensed attorney?

MR. CONNERY: Yes, I am.

MR. GREEN: And you have previously worked for EPA?

MR. CONNERY: I have not worked for EPA.

MR. GREEN: What?

MR. CONNERY: I have not worked for EPA. Many of these people who I presented I was saying had worked for EPA, but I, personally, have not.

MR. GREEN: Oh, you have never worked for them?

MR. CONNERY: No.

MR. GREEN: Thank you for your time.

MR. CONNERY: I don't know what that says about me.

MR. SCHWINDT: What we'll do is have Great River Energy make their presentation next, and why don't we take about a 15-minute break before we begin that testimony. Thank you.

(Recess taken.)

MR. SCHWINDT: The next presentation is from Great River Energy.

MR. MENNELL: Good morning. My name is

Page 500

James Mennell. I'm the managing partner of Environmental Law Group in Minneapolis. I'm also a professor of environmental law at William Mitchell College of Law in St. Paul, and I'm pleased to be here today on behalf of Great River Energy.

At issue in this proceeding is the simple question, whether ambient concentrations of SO2 in North Dakota's Class I areas have increased since the baseline date in late 1977 above the specified levels or increment allowed under the Clean Air Act. To this simple question, the answer is no. There is absolutely no actual air quality data from ambient air monitors, emissions testing, or CEMs that support the argument that SO2 concentrations have increased above allowable amounts since the baseline period. To the contrary, all evidence of actual air measurements in North Dakota's Class I areas indicate that SO2 concentrations in those areas have decreased. Quite simply, the facts establish that North Dakota's air quality has improved in its Class I areas and that the State's implementation plan has adequately prevented significant deterioration.

Under the Clean Air Act, increment consumption determinations are to be based on,

Page 501

quote, available air quality data. The only actual air quality data available regarding ambient concentrations of SO2 in North Dakota's Class I areas are from SO2 monitors located in those Class I areas. This air quality data includes thousands of actual measurements of the air in the Class I areas, over more than 20 years. The data conclusively demonstrates that ambient concentrations of SO2 in North Dakota's Class I areas have not even increased since the baseline period, much less consumed the additional increment available for growth under the Clean Air Act.

This finding is supported by the fact that more than 75 percent of the measurements for SO2 at the North and South Units are below the minimum detectable levels. Put another way, most days there's not any measurable concentration of SO2 in the park. This finding is also supported by the fact that numerous grandfathered baseline sources of SO2 have ceased or curtailed operations, and there's been a significant reduction of SO2 emissions from oil and gas sources located near North Dakota's Class I areas. It's also supported by the fact that a baseline source located to the west of the Class I areas in Montana, the Anaconda

Page 502

Copper Smelter, which was at one time reportedly the second largest source of SO2 emissions in North America and emitted more SO2 than all of the utilities in North Dakota combined, ceased operations in the early 1980s. It's also supported by the findings of the Federal Land Managers for North Dakota's Class I areas, who have certified that all major sources constructed in the state in the last 20 years do not cause significant deterioration to the Class I areas, and that, quote, air quality in North Dakota has actually improved. Such a finding is also supported by the recent draft modeling conducted by the Department and by the refined modeling conducted by Basin Electric's consultant, ENSR Consulting, that reflect compliance with increment requirements. Accordingly, there is absolutely no factual basis to contend that ambient concentrations of SO2 have increased in North Dakota's Class I areas or that North Dakota's SIP is substantially inadequate to ensure compliance with the Clean Air Act increment requirements.

EPA's preliminary and experimental computer modeling, which relies on variables stacked upon variables to guess at ambient

Page 503

concentrations of SO2 does not constitute valid, accurate or supportable evidence of historical or present SO2 concentrations in North Dakota's Class I areas, and may not be used to contend a violation of the increment. EPA used a new model, Calpuff, which has not been formally approved as a guideline model, is not allowed under North Dakota law, was used to approximate concentrations at distances longer than recommended by EPA's own guidance, and used different settings than recommended by EPA's own guidance. In fact, had EPA used the default option settings recommended by the Interagency Workgroup and EPA's own proposed rule regarding Calpuff, the results would have been found to be invalid under EPA's own assessment of model validity which, incredibly, only considers a model invalid if it is wrong by more than a factor of two, or, as one court put it, 200 percent wrong.

Not only is EPA using an unapproved and possibly inaccurate model, they're modeling without the appropriate meteorological data, and are modeling using incorrect baseline emissions estimates premised upon interpretations of the law that are counter to the Clean Air Act and inconsistent with congressional intent.

Page 504

Accordingly, there is no legal, factual, or plausible basis for the Department to conclude anything other than that North Dakota's SIP is, and has been, adequate to prevent significant deterioration.

Under the Clean Air Act, the term "baseline concentration" is defined to include: The ambient concentration levels which exist at the time of the first PSD application based on air quality data available and on such monitoring as the permit applicant is required to submit.

The only actual, quote, air quality data available for North Dakota's Class I areas is from the ambient air monitors located in North Dakota's Class I areas, which, again, have taken thousands of measurements over more than 20 years. Data has been collected from monitors in three separate locations inside Theodore Roosevelt National Park North and South Units. This data is of high quality, from EPA-approved monitors that have good data recovery, as will be discussed by Great River Energy's next witness.

When Congress included the phrase "air quality data available" in the Clean Air Act, it intended that actual air quality data was to be

Page 505

used for establishing baseline and assessing increment. As noted in the Senate Report to the 1977 amendments to the Clean Air Act, the purpose is to use actual air quality data to establish the baseline. Where sufficient actual data are not available, the state may require the applicant to perform whatever monitoring the state believes is necessary to provide that information.

In the landmark case concerning the PSD program, Alabama Power, the Court was clear that baseline concentration is to be determined using, quote, actual air quality data and expressly noted that, quote, monitors be used to establish baseline and assess increment.

EPA also has long supported establishing baseline concentrations through monitoring. According to EPA, in its first proposed rulemaking regarding PSD, baseline concentrations may be, quote, measured using monitoring. EPA reiterated this position in 1974 in approving PSD requirements in the state implementation plans, stating that, quote, baseline concentration may be established using monitoring as the method of analysis.

EPA also has supported that assessment of increment consumption may be accomplished through

Page 506

monitoring. In EPA's often cited draft New Source Review Workshop Manual, the agency states the assessment of existing ambient concentrations may be done by evaluating monitoring data.

Similarly, proposing amendments to the PSD program in 1979 EPA again stated, EPA agrees that monitored ambient data is valuable for such purposes as validating and refining models and, in some cases, providing a direct measure of increment consumption.

Even in its modeling guidelines included in Appendix W Part 51, EPA reiterates this position where it states: There are instances where the performance of a recommended dispersion modeling technique by comparison with observed air quality data may be shown to be less than acceptable. That is the case here. Also, there may be no recommended modeling procedures suitable for the situation. That is also the case here. In these instances, emission limitations may be established solely on the basis of observed air quality. Accordingly, Congress, the courts, and EPA have been clear that using monitoring data is appropriate in establishing baseline concentrations and in assessing increment consumption. This is

Page 507

particularly true given the unique nature of this proceeding.

The purpose of this proceeding is merely to determine whether, in fact, ambient concentrations of SO2 in the Class I areas have increased beyond those increments allowed under the Clean Air Act (i.e., has there been actual significant deterioration in air quality?). This is not a prospective permitting proceeding. In the permitting context, it's necessary to use a model to predict emissions because emission sources have not been constructed. Modeling is the only way to assess prospectively whether a new source will have consequential impacts on air quality. In the context of the present hearing, however, the question is whether the North Dakota SIP has been adequate to prevent significant deterioration in North Dakota's Class I areas. There is no need to predict emissions from yet to be built sources; that has already been done during the permitting of those sources, which, by the way, in the case of North Dakota, were already certified to be in compliance with PSD requirements. All that's required in this proceeding is the factual determination of whether ambient concentrations of

Page 508

SO2 have increased beyond allowable levels. The best evidence, and only actual air quality data to make such a determination, is that from the ambient air monitors located in the Class I areas.

Data from the ambient monitors located in North Dakota's Class I areas indicate that there has been no increase in ambient SO2 concentrations in those areas. This next slide which you've all seen several times, and for good reason, this slide demonstrates that measured SO2 concentrations in Theodore Roosevelt National Park North Unit have decreased dramatically on a 24-hour basis over the past 20 years. This diagram also demonstrates that there has been no increase in ambient concentrations in Theodore Roosevelt National Park South Unit on a 24-hour basis. The next slide demonstrates that measured SO2 concentrations in Theodore Roosevelt National Park North Unit have decreased dramatically on a 3-hour basis over the past 20 years. The diagram also demonstrates there has been no increase in ambient concentrations in Theodore Roosevelt National Park South Unit on a 3-hour basis. Right here is the answer to this proceeding. There is no evidence of significant deterioration in North Dakota's Class I areas.

Page 509

Now, EPA contends that despite this 20-year trend that monitoring data is insufficient to answer the question of whether North Dakota's SIP has been substantially inadequate to prevent significant deterioration because of the absence of monitoring data from 1976 to 1977. Interestingly, EPA's only remedy for such an argument is, at best, ironic. In short, it goes something like this: Because there is no monitoring data for these two years, we should reject the 20 years of actual data, and instead employ projected emissions estimates not based on any actual measurement of emissions from any of the relevant facilities during the baseline period, using a nonapproved model that relies on meteorological information collected more than a decade after the baseline date, and that are not linked in any way to the emissions on a particular day, to guess at what baseline concentrations might have been. It is not a very compelling argument as to why modeled emissions would present a more accurate assessment of SO2 concentrations than actual measured data.

Perhaps more importantly, monitored data from 1980 and '81, just a few years after the SO2 baseline date, still constitute the best available

Page 510

evidence of baseline concentrations and North Dakota's SO2 air quality trends. North Dakota law includes in the baseline concentration actual emissions representative of sources in existence on the applicable minor source baseline date. There is absolutely no actual air quality data from monitors, emissions test, or CEM data to support that ambient SO2 concentrations in 1980 and '81 are significantly different from 1976 and 1977, or that 1980 and 1981 measured emissions are not representative of sources in existence during those years. EPA carries the burden of proving that this is the case in order to initiate a SIP call. As there is no actual air quality data that exists to support such a position, EPA clearly cannot meet this burden.

More specifically, there is no evidence to support that ambient concentrations in the North Unit, on a 24-hour basis, were more than approximately five times lower in 1976 and '77 than they were in 1980 to '81, which is what EPA would need to establish to show increment consumption above the 5 microgram per cubic meter threshold when compared to the most recent full year of monitored data. Look here at this diagram. The

Page 511

dotted blue line at the bottom reflects where SO2 concentrations would have had to have been in1976 and '77 to show an increment violation when compared to the most recent full year of monitored concentrations. There is no evidence to support that this was the case.

Similarly, turning to the next slide, there's no evidence to support that the ambient concentrations in the South Unit, on a 24-hour basis, were more than two times lower in 1976 and '77 than they were in 1980 and '81 to show increment consumption above the 5 microgram per cubic meter threshold when compared to the most recent full year of monitored data. Again, the dotted blue line reflects how low ambient concentrations would have had to have been to show an increment violation. And, again, there is no evidence to support such a finding.

With respect to the 3-hour standard, and as shown on the next slide, there is no evidence to support that the ambient concentrations in the North Unit were more than 80 times lower, and in the South Unit more than four times lower, in 1976 and '77 than in 1980 and '81, which, again, is what EPA would need to establish to show increment

Page 512

consumption above the 25 microgram per cubic meter threshold when compared to the most recent full year of monitored data. Thus, evidence, common sense, and North Dakota law all support that 20 years of ambient data from the State's Class I areas demonstrate that ambient concentrations of sulfur dioxide have not increased since the baseline date above the specified increment allowed under the Clean Air Act.

The recent modeling conducted by the Department also supports this finding, as established by monitored data, that sulfur dioxide concentrations have not increased above allowable increments. This is particularly true when considering that the Department's analysis is more conservative, or protective, than required by North Dakota law and does not employ the appropriate refinements to the modeling that would allow for better model performance and indicate lower increment consumption. Refined modeling conducted by ENSR and as discussed earlier in this proceeding also supports the finding as established by monitoring data that sulfur dioxide concentrations have not increased above allowable increments. While such draft modeling supports the finding of

Page 513

no significant deterioration, it is not the appropriate basis for any regulatory determination regarding the increment issue under consideration here.

With respect to attempts to address the increment question through modeling, in addition to being unnecessary given the unique nature of this proceeding, and the monitored data I've just discussed, there are at least five significant reasons why the draft and preliminary modeling efforts to date may not be used to contend that ambient SO2 concentrations have increased above the allowable increment.

1. Use of Calpuff, which is not an approved guideline model, is not allowed under North Dakota law.

Draft modeling conducted by EPA and the Department is not valid or accurate air quality data and may not be used to contend a violation of the increment. Because of concerns about modeling inaccuracy and fairness associated with using models, Congress required that EPA, quote, specify with reasonable particularity each air quality model or models to be used under specified sets of conditions for purposes of PSD. To meet this

Page 514

requirement, EPA has set forth approved models in its Guideline on Air Quality Models included in 40 CFR, Part 51, Appendix W. Calpuff is not included in Appendix W as an approved model. In fact, and as you have heard, there is no long-range transport model currently approved in EPA's Guidelines on Air Quality Models. As I mentioned before, in circumstances where there is no recommended model, EPA's own modeling guidelines expressly provide that use of monitored data is appropriate, even in the permitting context, for making increment determinations.

North Dakota law requires that all estimates of ambient concentrations must be based on the applicable air quality models specified in the Guidelines for Air Quality Models as supplemented by the North Dakota Guidelines for Air Quality Modeling Analysis. Calpuff is not an approved model under either of these guidelines. Further, under the Clean Air Act, as well as state and federal regulations, before a guideline model may be adjusted or a nonguideline model may be used, such models and adjustments must be subject to peer review, notice, public comment and hearing. As noted by EPA in Appendix W, all

Page 515

changes to the guideline must follow rulemaking requirements, and EPA will promulgate proposed and final rules in The Federal Register to amend Appendix W only after ample opportunity for public comment is provided for each proposed change and public hearings. Calpuff, and adjustments to Calpuff, have not been subject to such an approval process. Accordingly, use of Calpuff is inappropriate as the basis for any regulatory decision.

2. Preliminary efforts to use this model highlight its many uncertainties and questionable validity and underscore that the model is not yet ready to be used for regulatory purposes.

The problem with using Calpuff for these proceedings is perhaps best illustrated by the Department's finding that if the IWAQM recommended settings were used, as EPA also recommends, the model would be more than 200 percent incorrect, and thus invalid under even EPA's generous measure of model validity. As noted by the Department in its validation review, changing all control file settings to IWAQM-recommended values, for example, would likely move predicted-to-observed ratios outside of the factor of two window. Put another

Page 516

way, the model, when used as recommended, does not provide valid results.

Such a conclusion, however, should not be surprising considering that both EPA and IWAQM, who is working to develop use of this model, have stated that the model is only appropriate for modeling impacts at distances up to 50 to 200 kilometers. Here EPA is attempting to use this model to guess at ambient concentrations at distances well over 200 kilometers. Inaccurate results in this instance are also consistent with EPA's stated concerns about the ability of models to predict short-term concentrations. As noted by EPA in its modeling guidelines, quote, models are more reliable for estimating longer time-averaged concentrations than for estimating short-term concentrations at specific locations.

Significantly, EPA has not conducted, or at least provided, any validation of the Calpuff model as modified by EPA. Reliance on the Department's limited validation review by EPA does not make sense either as the validation review by the Department of Health was conducted using year 2000 data and the modeling was conducted using years 1990 through '94. Great River Energy's third

Page 517

witness today will discuss some of the additional limitations of that validation review.

An excellent indicator of EPA's flawed analysis, and the problems with the way Calpuff is being used here, is that all second highest high predictions of SO2 concentrations for both 3-hour and 24-hour standards for the South Unit using either the, quote, regulatory defaults or the, quote, locally developed input settings set forth in EPA's draft modeling report at page 37, were higher than any actually measured highest second high measurement in that area over the last ten years of available data. Courts considering model validity have typically held that an agency's choice of model will be sustained only where it bears a rational relationship to the characteristics of the data to which it is applied and that EPA must back up any modeling analysis with checks against the real world data. That has not been done here.

So far, EPA and the Department have pointed to two different sets of results each, when use of the unapproved Calmet and Calpuff models are used to guess at ambient concentrations. The modeling exercise, to say the least, is complicated

Page 518

and relies on assumptions about hundreds of different variables to ultimately guess at anticipated concentrations. Expert upon expert can come through this door and explain why certain settings should be used. In fact, Great River Energy plans to present expert testimony from Earth Tech, the company that developed the Calpuff model, about which settings, adjustments and evaluations might yield the most accurate results. Both EPA Region VIII and the Department have themselves opted to use different settings than developed and recommended by EPA headquarters, the Forest Service, the Fish and Wildlife Service as part of the Interagency Workgroup on Air Quality Models.

While all the experts may not agree on which settings ought to be used, the experts do agree that changing settings or making certain assumptions ultimately affects a model's results. Which settings, if any, are correct? It is, at best, unclear. And this perhaps as much as anything exemplifies why use of this unapproved model, for which only a very limited validation assessment has occurred, is not appropriate to assess whether North Dakota's SIP has adequately prevented significant deterioration.

Page 519

3. Modeling conducted to date does not use the right measure of baseline emissions.

Another problem with the modeling conducted to date is not just that the agencies have elected to use a nonguideline model, or that the model is likely inaccurate, but that the wrong numbers are being fed into the model. How accurate the model may or may not be is ultimately immaterial if the wrong emissions numbers are used to establish baseline emissions and baseline concentrations. Unfortunately, neither EPA nor the Department have used the correct baseline emissions in their modeling.

Given the different interpretations put forward about what constitutes baseline emissions, it's possible to conclude that some might feel that this term is ambiguous in the context of assessing increment consumption. Under North Dakota law, if a word or phrase is unclear, it's appropriate to look to the legislative history to determine its meaning. Further, North Dakota law provides that where the State adopts a federal statute, it does so with the implied knowledge of the federal interpretations placed on such statute. Accordingly, I think it's appropriate to look to

Page 520

the legislative history of the Clean Air Act to determine how baseline concentration should be evaluated.

According to the legislative history, baseline emissions should be based on allowable emissions of baseline sources. Here's an excerpt from the House Report to the 1977 amendments to the Clean Air Act, quote, Baseline pollution level is the level of pollution calculated to exist assuming plant capacities as of January 1st, 1975. The committee emphasizes that the baseline pollution level includes existing sources' emissions calculated on the basis of total plant capacity. For example, even if a plant has been operating at 60 percent capacity, its total capacity -- its total capacity for emissions is included in the baseline. Furthermore, no rollback in emissions from existing plants would be required under the provisions of this section.

EPA's position, as articulated by Richard Long's testimony in response to my question on Monday, is completely counter to this clearly expressed intent of Congress about how baseline emissions should be established. Again, the House Report repeatedly makes clear that total plant

Page 521

capacities are to be included in the baseline concentration.
Again, the baseline pollution level includes the ambient concentrations calculated to exist, assuming total plant capacities, additional plant capacities for new sources which -- and additional plant capacities for new sources which receive new source permits prior to the date of enactment. Therefore, the bill's definition of baseline level authorizes the grandfathering not only of all existing industrial capacity, but also of all new capacity under construction.
Given the clarity of the legislative history on this issue, there's no doubt that allowable emissions should be used to establish baseline emissions for any modeling exercise to assess increment consumption. Significantly, EPA, as part of its preamble to the 1980 PSD regulations actually reiterates this congressional mandate. Quote, EPA has concluded that increment consumption and expansion should be based primarily on actual emissions increases and decreases which can be presumed to be allowable emissions for sources subject to source-specific limitations.
This interpretation is also expressly

Page 522

provided for under EPA's regulations and North Dakota law, which expressly defines "actual emissions" to mean source-specific allowable emissions. Thus, North Dakota law, consistent with congressional intent, provides that allowable emissions may be used for determining baseline SO2 emissions. Baseline emissions, therefore, should be used for source-specific -- therefore, should be based on source-specific allowable emissions.
North Dakota law also defines "actual emissions" to include those emissions that are, quote, representative of normal source operation. When considering the 3-hour and 24-hour maximum standards that are at issue here, the source-specific allowable emissions accurately reflect normal source operation of many of the baseline sources. Allowable emissions, which reflect the design and expected operation of many facilities, are representative of, quote, normal source operation and should be used to determine baseline emissions. Such an approach is consistent with facts provided by Great River Energy and other utilities establishing that these facilities may have met, or in some cases exceeded, allowable emissions on a short-term historic basis. Such an

Page 523

approach also is consistent with congressional intent that increment consumption come from new sources or modifications that occur after the baseline date, rather than from the fluctuating emissions of existing sources.
EPA contends that baseline concentration should be calculated based on the estimated emissions from certain sources for the two-year period prior to the minor source baseline date unless there's been a strike or a fire. Use of a two-year period prior to the minor source baseline date for establishing baseline would, for many utilities, create an artificially low baseline concentration that is not representative of, quote, normal source operation, source operation prior to the baseline date, or source capacity at the baseline date. Actual SO2 emissions from utilities are affected by numerous variables, including electric demand, plant maintenance, and fuel quality. Estimated SO2 emissions are further affected by variables such as emission factor characteristics. Selection of a two-year period for estimation of emissions for establishing baseline will artificially reduce baseline such that, even without any modification of a plant, the

Page 524

facility could be viewed as consuming increment based on nothing more than normal emissions fluctuation.
Baseline emissions used in EPA's modeling analysis also are incorrect because the agency arbitrarily decided to exclude numerous minor source contributors to baseline emissions, which is amazing when in the same breath they stood up here and talked about the impact such sources would have on the Class I areas. Evidence indicates that emissions from a number of minors sources, consisting primarily of oil and gas wells located in close proximity to the Class I areas, prior to the baseline date, have since decreased significantly, thus expanding available increment. EPA's decision to not include these sources as part of the baseline date is arbitrary and capricious.
4. Draft modeling conducted to date also fails to appropriately assess increment consumption. Increment consumption, to the extent that it is based on modeling, should for purposes of this type of proceeding compare baseline allowable emissions, as I just described, to present-day CEM data paired with current meteorological data. This provides the most

Page 525

realistic assessment of current emissions and the appropriate comparison to determine whether air quality has in fact degraded. Use of five years of meteorological data from the early 1990s is not the best, or even relevant, data for assessing current concentrations of SO2. Again, this is not a prospective permitting proceeding. The purpose of this proceeding is to consider whether in fact SO2 concentrations have increased in the Class I areas. The best and most relevant factual information concerning present-day air quality should be used to make such an assessment.

Draft modeling does not use comparable data when comparing baseline and current emissions.

Comparison of AP-42 emissions with present-day CEM data in the EPA and Department analyses is arbitrary and yields an incorrect assessment of increment consumption. As Great River Energy documented and provided to the Department of Health last September, and will again submit in written comments before close of the record in this proceeding, based on five years of CEM data, AP-42 emissions estimates severely underestimate emissions compared to CEM

Page 526

measurements. The result of using different methods for baseline and current emissions is that use of these different methods can make it appear that increment is consumed, where in fact actual emissions have remained constant. This results in an inherently flawed analysis. Ironically, EPA's own draft modeling report, while failing to consider this difference, makes the best case for the inequities that result by using different methods for comparing baseline and current emissions.

According to EPA, EPA believes that any increment analysis should follow the same methodology for determining emissions in the base year as in the current year. Using the same methodology allows for an objective comparison. To do otherwise does not provide comparable data sets. If different methodologies were used to determine emissions for the base year and the current year, comparing the two data sets would produce inappropriate conclusions.

Accordingly, if the Department decides not to consider allowable emissions as the baseline, then any modeling comparison must at least be based on either the same method (for example, AP-42) for

Page 527

assessing baseline and current emissions, or should attempt to adjust emissions estimates to reflect the bias inherent to the different methodologies.

EPA's draft modeling analysis also is flawed in that it fails to reflect the variances granted to certain North Dakota sources. There is absolutely no basis in the Clean Air Act or its legislative history that states were required to, quote, make up increment where a permit was issued pursuant to the alternative increment standards under Section 165 of the Clean Air Act. After 20 years of silence on this issue, EPA's recently adopted position is not only unsupported by law; it's arbitrary and capricious.

5. Draft modeling makes answering a simple question, to which there is a simple answer, unnecessarily complicated.

Under consideration in this hearing is whether to answer the PSD question by looking to readily available facts and air quality data provided by ambient monitors in the Class I areas, or instead employ a Rube Goldberg methodology to evaluate whether ambient concentrations of SO2 have increased above the allowable increment. Rube Goldberg, for those of you who may not be aware of

Page 528

his work, is a Pulitzer Prize winning cartoonist who is famous for drawings that make simple tasks, such as opening a door, into extraordinarily complicated endeavors. Here is an example of one of his drawings that shows a 19-step process to accomplish the task of sharpening a pencil.

See, the kite goes up in the wind, lifts up the birdcage there and allows the moths to eat the shirt, which then drops the boot onto the switch, causing the iron to heat up and cause smoke, which smokes the possum into the basket, lifting the birdcage, allowing the woodpecker to sharpen the pencil.

What I have next on the screen over there is Great River Energy's Exhibit 1. That exhibit points out just some of the many variables and assumptions that are involved in attempting to model increment consumption. Our consultant, Earth Tech, will talk about some of these variables and how they may impact results. As you can see and as we heard about for the last three days, these include an almost limitless range of variables related to many different aspects of modeling, including control file settings, source inputs, meteorological data, deposition, chemistry and

Page 529

dispersion characteristics. You'll note that the modeling approach, like a Rube Goldberg machine, makes answering the simple question, have SO2 concentrations increased above allowable increments, unnecessarily complicated, particularly when we have the answer to that question based on monitored data.

With respect to these variables, EPA in its Appendix W discusses how, for even approved models, they result in, quote, an inherent uncertainty and that many unknown and unmeasured variations afflict modeled results. This web of variables and uncertainties is compounded even further when considering the many ways that EPA and the Department have manipulated model settings. According to EPA's draft modeling analysis, the agency has made some adjustments, appropriate edits, relatively minor changes and that the model was modified and the option to extrapolate was deployed, and settings adjusted to provide better agreement. Further, correspondence such as that from EPA's modeler to the Department of Health last year that discuss, quote, screwups in the Calpuff input files, possible, quote, glitches in the software, lead to even greater concern about the

Page 530

accuracy of modeled results. If even one of these many variables is not appropriately selected, is screwed up, or contains a glitch, the modeled results could be significantly altered.

Given the limited efforts to validate the model, these adjustments to the model only make the accuracy of any modeled results more unclear and further cloud the answer to the question of whether ambient concentrations of SO2 have increased above allowable increment, a question to which there already exists a simple and clear answer based on actual monitored data.

In conclusion, draft modeling conducted to date by EPA, or even the Department of Health, for that matter, cannot be used to contend a violation of the increment. This modeling has not been conducted using an approved model, has not been conducted using recommended or appropriate model settings and data, has been conducted for distances greater than for which the model is recommended, has not been thoroughly and appropriately validated, and has not been based on the appropriate baseline emissions or the appropriate assessment of increment consumption. Accordingly, draft Calpuff data is just that, draft.

Page 531

This draft data simply is not appropriate to answer the question of whether ambient concentrations of SO2 have increased above the allowable increment. The answer to this question, however, is provided by over 20 years of ambient air measurements in North Dakota's Class I areas. Actual air quality data from the Class I areas, as measured by the ambient monitors, makes clear that SO2 concentrations have not increased above allowable increment and that North Dakota's state implementation plan is adequate to prevent significant deterioration.

Accordingly, based on this and other information discussed during these proceedings, Great River Energy recommends the following findings:

I. All available air quality data indicates that ambient concentrations of sulfur dioxide in North Dakota's Class I areas have not increased above the increments allowed under the Clean Air Act.

And, 2, there's no valid or accurate evidence to support that there has been a violation of the Class I increments or that North Dakota's state implementation plan has been substantially

Page 532

inadequate to prevent significant deterioration.

Thank you.

MR. SCHWINDT: Thank you, Mr. Mennell. A couple questions that I have. I think there's some language, and I believe it's in Appendix W, that indicates that allowable emissions should not be used if there's more accurate data to indicate what the emissions were. How do you see that as modifying the cites that you had of the Clean Air Act and the regulations?

MR. MENNELL: I think that's a -- ultimately the decision whether to use allowable or some other basis for establishing the baseline emissions is a choice for the Department. And I think that there's clearly legislative history that supports the use of allowable emissions. I think you could be very consistent with the Clean Air Act in using allowable emissions. I think it's questionable whether there is better data available. I don't believe that there are good emissions measurements or any actual measurements for any of the plants during the baseline period that can be used to establish what those baseline emissions that then turn into concentrations might have been, so it's more appropriate to use

Page 533

allowable emissions so you don't have increment consumption coming from sources based merely on the fluctuation of their emissions.

MR. SCHWINDT: And then have you done an analysis of the difference between the AP-42 calculated emissions for 2000-2001 and the CEMs data?

MR. MENNELL: I believe we have. We plan to submit that information as part of our written comments. It's pretty highly technical, and I'm also an English major, so we'll probably get that into you before the close of the comment period.

MR. SCHWINDT: Luckily, I'm not an English major. Okay.

MR. MENNELL: Thank you.

MR. SCHWINDT: Doug, do you have any questions?

MR. BAHR: I don't have any.

MR. SCHWINDT: Okay. Any other questions? Lyle.

MR. WITHAM: Lyle Witham, Attorney General's Office. Jim, it's been a few months now since I did the research on this, but it's my understanding that there is a House version of the bill, of the Clean Air Act, PSD amendment, a Senate

Page 534

version and then there was a compromised committee position in which the final definition that ended up as a baseline concentration that ended up as Section 169, Subsection 4 of the Clean Air Act. Is that your understanding, also?

MR. MENNELL: My understanding is that there were two years' worth of Senate versions in the legislative history. The House version is what was adopted by the conference committee and that this language here is what is reflected as the intent of the Clean Air Act about how baseline concentrations were to be assessed.

MR. WITHAM: You're saying that -- I don't know that it's useful to -- that's not my recollection, but that's something we can address in comments afterwards. It was my recollection that there was -- that the conference committee in which they came up with this idea of using monitoring and actual air quality data which you are saying we should use didn't come to a conclusion on that. In fact, I would argue that you could -- that what you could conclude is that they punted on that question, if you look at the definition, and so did EPA. If you look at the -- I'm going to ask you -- Mr. Melland just mentioned

Page 535

this language this morning. They said, If a source can demonstrate that its operation after the baseline date is more representative of normal source operation than its operation preceding the baseline date, the definition of actual emissions allows the reviewing authority to use the more representative period to calculate the source's actual emissions contribution to the baseline concentration. EPA thus believes that sufficient flexibility exists within the definition of actual emissions to allow any reasonably anticipated increases or decreases genuinely reflecting normal source operation, which is the language Mr. Melland focused on, to be included in the baseline concentration. And then if you look at the definition of actual -- the idea of using actual emissions came out of the Alabama Power case, and if you look at the definition of actual emissions as in the federal rules and in the state statute, they define actual emissions as either --

MR. BAHR: Lyle --

MR. WITHAM: The question is I'm going to ask you to comment on this. -- either allowable emissions or actual emissions. Now, would you comment on the application of Alabama Power, the

Page 536

conclusion there, to those rules and what you're claiming in terms of your -- that we should look to this particular language from the legislative history?

MR. MENNELL: I will try. The first part of your question talked about EPA's interpretation and your impression that Congress did not choose to go with the allowable emissions approach. I think that would not be supported, particularly if you look back at the 1978 regulations where EPA in the preamble discussion there, which I don't have right here, but I can provide to you, I think I provided to you before as part of the September 7th letter, clearly also was supportive of the use of allowable emissions. I think it's little telling that the definition of "actual emissions" included in Part 52 and are included in the state law, included in that definition is allowable emissions for sources which have source-specific limits. I think the Department has the discretion to do it, and I think it is consistent to do so with -- consistent with legislative intent to do that.

MR. WITHAM: These are the issues I address in the legal briefing or in the legal -- in additional comments, but these are issues that --

Page 537

but, in fact, it was the '78 regulations that were challenged in Alabama Power over the rule; correct?

MR. MENNELL: Not on that basis, though. I would also --

MR. WITHAM: I think I'll leave that because I don't think it's appropriate to go into anymore at this point. I just wanted to have a chance to comment.

Let's focus on the language then from the actual statute. What is your position on the meaning of the phrase "actual air quality data"? Are you saying that means only monitoring data?

MR. MENNELL: I would say that monitoring data clearly falls within that definition when we have that type of data.

MR. WITHAM: Besides monitoring data, what else could be an example?

MR. MENNELL: I believe you could have modeling that relies on that monitoring data.

MR. WITHAM: And how would you conduct that?

MR. MENNELL: I think I tried to describe how I believe the Department of Health could do that assessment in this type of proceeding, but I'm

Page 538

not -- how would I do what exactly, Lyle?

MR. WITHAM: Do modeling that incorporates monitoring into the model.

MR. MENNELL: Well, I mean, typically you would have monitored concentrations. You would take those monitored concentrations and use them to establish a baseline. You might also be able to include some additional increases that might be allowable; for example, a plant that was built but not yet operating at capacity at the baseline date. You could model those in and that would be how you would establish the baseline date to be used in the modeling analysis based on both modeling and monitoring.

MR. WITHAM: How would you factor in the increase in oil and gas production from the '77 -- '75 through the '77 period through the '82 period when it was the highest? How would you factor that in?

MR. MENNELL: I wouldn't. I've said that I believe that the monitoring data is what should be used here, and the monitoring data clearly demonstrates that there hasn't been significant deterioration. But I think if there is a modeling analysis that's going to be undertaken here, that

Page 539

clearly the emissions from those sources, as I understand the facts, and I don't know all the facts with respect to those sources, have continued to be controlled and there has been a big reduction and that should result in increment expansion.

MR. WITHAM: Do you agree that it is a problem that we do not have monitoring data before 1980?

MR. MENNELL: I think it would be ideal if we had monitoring data before 1980. I believe, though, that if you look at what monitoring data we do have, it's very, very likely to demonstrate there's no evidence to support that the actual concentrations that have been at such a level so as to demonstrate -- so as to demonstrate an increment violation. It's sort of like Thomas Jefferson's quote about democracy, it's not perfect, but it's the best thing we've got.

MR. WITHAM: I have no further questions.

MR. SCHWINDT: Any other questions? No. Thank you.

MR. MENNELL: We've got three more witnesses. We'll have next Jon Sandstedt from Earth Tech who is going to talk about the monitored results a little bit in a little bit more detail.

Page 540

The second one, Richard Londergan, also from Earth Tech, will talk about the monitoring, and, finally, we'll have Mary Jo Roth from Great River Energy.

MR. SANDSTEDT: Thank you. I'm Jon Sandstedt. I'm the program director of air quality with Earth Tech in Earth Tech's Minneapolis office. In my testimony today, I will discuss the results of an analysis that my firm completed to evaluate the trends of measured sulfur dioxide concentrations in Theodore Roosevelt National Park. It's my opinion that the body of data, which was acquired in conformance with applicable state and federal rules and guidelines governing the collection of ambient air quality data, demonstrates that ambient SO2 concentrations in the park have decreased or remained constant. My firm's analysis supports the assertion that air quality, in terms of SO2 concentrations, has not degraded in North Dakota's Class I areas.

Earth Tech was retained by Great River Energy to assist in the evaluation of the available ambient SO2 data that has been collected at the park. Earth Tech is an environmental consulting firm headquartered in Long Beach with over a hundred offices located primarily in North America,

Page 541

but with operations in Europe, Asia and South America.

I have worked in the air quality and air emissions field for over 26 years, and during this span of time I have been involved with air quality measurements in a variety of capacities. During my graduate work in mechanical engineering I calibrated and operated instruments to measure particulate and gaseous pollutants, including SO2, under an EPA grant to study long-range pollutant transport and transformation. I worked as a product engineer for a company that manufactures instruments for measuring air quality and air flow. While employed as a research and development engineer for a filtration product manufacturer, I designed and operated an instrument system for measuring air pollution control efficiency. As a state agency employee, I compiled statistics on Alaska's ambient air monitoring data. And I have been employed in the consulting field for the past ten years, and in this capacity I have managed and provided technical direction on a number of ambient air quality monitoring projects.

My testimony today will consist of four elements. First, I'll discuss briefly how the data

Page 542

was collected, I'll describe how we processed the data, I'll discuss the results of our analysis, and, finally, I will compare the results with the PSD Class I increments for SO2.

The Department has monitored ambient SO2 concentrations using the continuous instrumental pulsed fluorescent method at specific locations in the park since 1980. The pulsed fluorescent method involves drawing ambient air through a sample chamber to where it's irradiated with pulses of ultraviolet light. This exposure causes any SO2 in the sample to release a characteristic light or fluorescence. The amount of fluorescence measured is proportional to the SO2 concentration.

The pulsed fluorescent method is a recognized continuous monitoring method for SO2 in accordance with the regulatory requirements for designation of reference or equivalent monitoring methods under 40 CFR 53.

EPA has established detailed regulations that govern ambient air quality surveillance. These rules are codified in 40 CFR 58. These rules, which require detailed quality assurance/ quality control, or QA/QC, procedures and documentation, have applied over the history of the

Page 543

Department's pulsed fluorescent ambient SO2 monitoring in the park since 1980. All of the data that we evaluated were obtained from the EPA's Aerometric Information Retrieval System, referred to by the acronym AIRS. And data that is available on the AIRS monitoring system must satisfy the federal EPA ambient QA/QC requirements. Therefore, all the ambient SO2 data included in our evaluation can be considered to satisfy the federal EPA QA/QC requirements. The AIRS monitor identification codes for the monitoring stations where the data we analyzed was collected are listed in Table 1. Figure 1 here is a map showing the locations of the monitoring sites based on the geographic coordinates listed in AIRS. Please notice that there are two sites, the South Unit, site A, was operated until 1985, then was moved to the other location in 1985.

To facilitate comparisons with the ambient air quality increments of interest to this proceeding, we calculated the 24-hour and 3-hour average concentrations from the raw 1-hour average concentrations obtained from the AIRS database following the procedures specified in 40 CFR Part 50.4 and 50.5. The 24-hour averages were

Page 544

calculated from successive nonoverlapping 24-hour blocks starting at midnight each calendar day, and conventions specified in the rule were followed for dealing with missing hourly values.

Similarly, the 3-hour averages were calculated from successive nonoverlapping 3-hour blocks starting at midnight each calendar day. And, again, conventions specified by rule were followed for dealing with missing hourly values.

There were numerous observations reported as zero. It is normally considered conservative to treat these observations as equal to the minimum detection limit, or MDL, of the instruments used to measure the SO2 concentrations. The MDLs for the methods used at the park are specified in AIRS as 2 parts per billion, or 5.6 micrograms per cubic meter. However, more than 5 percent of the values in the data are reported as only 1 part per billion. That means that there are 14,000 observations that are -- in the database that are reported to be less than the MDL. Therefore, we treated the MDL as 1 part per billion for our analysis and used this value to replace the reported zero values.

Concentrations measured at the North Unit

Page 545

are generally greater than the concentrations measured at the South Unit. We've seen that in the graphs for the last three days now. 24-hour concentrations are variable, ranging from the MDL of 2.62 micrograms per cubic meter on the low end on up to 162 micrograms per cubic meter at the North Unit, and ranging from the MDL on up to 35.6 micrograms per cubic meter at the South Unit. 3-hour average concentrations are also variable, ranging from the MDL on up to 399 micrograms per cubic meter at the North Unit and ranging from the MDL on up to 93.5 micrograms per cubic meter at the South Unit.

The vast majority of the observations were less than the MDL at all three monitoring sites. Figure 2 here represents the percentage of detectable 1-hour average SO2 concentrations measured at the three monitoring sites by calendar quarter. Concentrations greater than the MDL are typically measured only 5 to 25 percent of the time at the North Unit and only 3 to 15 percent of the time at the South Unit.

The upper percentiles by year for the North Unit monitoring site are presented in figure 3. Figure 3 demonstrates that the concentrations

Page 546

have decreased over the period of record. The trend is a decreasing trend, demonstrating improved air quality.

Likewise, the upper percentiles by year for the South Unit monitoring site are presented here in figure 4. We did not bother presenting the 50th percentile on the chart because it was equal to the minimum detection limit for all years. Figure 4 shows that the concentrations have remained constant over the period of record, demonstrating that air quality has not deteriorated.

Federal rules specify that ambient increments can be exceeded once each year. Therefore, the appropriate concentrations to measure -- therefore, the appropriate concentrations to compare to the ambient increments are the second highest concentrations measured at each site each year.

Figure 5 here is a plot of the second high 24-hour average concentrations measured each year in both the North and South Units, the graph Jim showed earlier, it's very similar to the graph that Mr. Connery showed this morning and that Mr. Winges presented yesterday, and, in fact, similar to the

Page 547

trend lines we've seen presented by the Health Department. I think there's something comforting in these similarities. We've seen several different presenters all looking at the same data and pretty much telling the same story. I guess I would contrast to the modeling where we've seen several presenters presenting varied opinions on the way the model should be run, what inputs should be used and difference in the results. I guess this would underscore in my mind Mr. Connery's earlier remark that why ambient monitors probably should be used as the gold standard, as he characterized it.

We characterized air quality trends by performing a least squares regression on each of the data sets. The data for the two South Unit monitors were combined using Monitor A data from 1980 through the third quarter of '85 and Monitor B data from the fourth quarter of 1985 to the present. The trend line for the North Unit data decrease by a factor of 5 between 1980 and 2000. The trend lines for the South Unit are essentially constant across the period of record.

Figure 6 is a plot of the second high 3-hour average concentrations in both the North and

Page 548

South Units. And, again, we see the same trend line -- or the same type of trend line we saw for the 24-hour data on the previous slide. Therefore, one could conclude that the air quality has not degraded such that the ambient increments would be exceeded.

As noted in the earlier testimony, the body of quality-assured data goes back only to 1980 and there is no data available to establish what the actual baseline concentration was when all of the baseline emissions sources were operating in the '76-'77 time frame.

I think after listening to the testimony over the past couple of days, we all realize just how important it would have been to have reliable monitoring data from '76 and '77 to define the baseline concentration. I ask you to suppose that we had a time machine available to us. So let's take 50 current generation pulsed fluorescent SO 2 monitors with us in our time machine back to 1976 and set them up to be collocated with all the Calpuff model receptors that EPA would like to see in the Calpuff model.

Now, let's assume that the monitors gave us readings as low as EPA would like to have us

Page 553

MR. SANDSTEDT: Well, I guess I'm basing that on the presentations of the other presenters, and I'm thinking that -- if I interpreted what was being said is that it was customary, and certainly to explain for the higher emissions in the early '80s, I believe the explanation was that there was flaring of emissions going on in the oil and gas facilities which is not occurring today.

MR. SCHWINDT: So you don't have any specific data that you're referencing?

MR. SANDSTEDT: I don't have any specific data to suggest that, no.

MR. SCHWINDT: Okay. Thank you. Any other questions?

MR. WITHAM: Lyle Witham, Attorney General's Office. Do you agree that if a monitor would have been -- if you go back in your time machine and a monitor would have been out there in the park, that the 3-hour baseline concentration would have been the second highest over that period of time, the second highest concentration recorded by that monitor?

MR. SANDSTEDT: Could you repeat the question? If there had been monitors --

MR. WITHAM: If there had been a monitor

Page 554

out there and you had a year of monitoring 3-hour data and a year of monitoring 24-hour data, how would you establish the baseline concentration for that period of time?

MR. SANDSTEDT: The EPA guidance does suggest that you would select the second high concentration from the year to represent the baseline concentration.

MR. WITHAM: For both 3-hour and 24-hour?

MR. SANDSTEDT: The second high 24-hour and the second high 3-hour, yes.

MR. WITHAM: I have no further questions.

MR. SCHWINDT: Thank you. Paul, did you have a question?

MR. GREEN: Would you go back to figure 6, please?

MR. SANDSTEDT: Figure 6? There we go.

MR. GREEN: We have a spike between 1980 and '82 or '83 of something like 360 micrograms per meter cubed and yet we have a trend coming down crossing the line at about 100 micrograms per meter cubed. If you're ever doing any chromatograph work, it seems like you've got one spike following up like that and you would have another one. How can the one be coming down when you have a spike

Page 555

that high?

MR. SANDSTEDT: The trend line is just to represent a linear regression of the data.

MR. GREEN: I'm sorry.

MR. SANDSTEDT: The statistics do -- what the statistics do, that's how you input this data to perform your regression. The trend line is what the data yields.

MR. GREEN: What did you say? I am very hard of hearing.

MR. SANDSTEDT: The bright yellow line which represents the trend line for the North Unit is a linear regression of the data that was in the database. So I'm not sure that I could give you a good mathematical reason on the blackboard, but it is a normal linear regression of the data in the database projected analysis.

MR. GREEN: It would almost seem your trend would have to go up a little bit when you've got a spike that high.

MR. SANDSTEDT: Again, it's a linear regression of all the data in the database.

MR. GREEN: In other words, it looks good on paper.

MR. SCHWINDT: Any other questions? No.

Page 556

Thank you, Mr. Sandstedt.

MR. LONDERGAN: My name is Richard Londergan. I'm the senior program director with Earth Tech. I work with the atmospheric studies group in Earth Tech's Concord, Massachusetts, office. In my testimony today, I will discuss Earth Tech's review of the application of the Calpuff model for the assessment of SO2 increment in Class I areas in western North Dakota and eastern Montana. This review is concerned primarily with technical issues relating to the application of Calpuff and its companion meteorological model, Calmet, including the evaluation study performed by the North Dakota Department of Health, which was used to select and justify alternative options and parameter settings for Calmet and Calpuff.

I would like to state at the outset that we recognize the knowledge and expertise of the modeling staff at both the Department and EPA Region 8 to perform this type of modeling. Our comments and criticisms are intended to be constructive, pointing toward ways that modeling and its use in the overall decisionmaking process could be improved, consistent with the overall

Page 557

intent of the hearing.
Our review has reached three main conclusions. First, the model selected by EPA Region 8, as a number of people and the Department -- has not been officially approved for evaluating increment consumption as has been covered by a number of speakers. EPA Region 8 and the Department did not follow appropriate procedures for applying the nonguideline model. The Department certainly went further in its performance evaluation than anything that Region 8 did. Second, documentation of the sensitivity analysis which was conducted by the Department to select their modeling approach is incomplete. We cannot tell whether that analysis was adequate based on the documentation. And, third, the limited performance evaluation by the Department does show systematic prediction bias for peak concentration values at the one monitor representative of a Class I area, although that bias is within the factor of two generally considered acceptable performance.
I have 28 years of professional experience with air quality modeling, permitting and applied research, including numerous model performance

Page 558

evaluation studies. I have recently applied Calpuff to evaluate the impact of proposed and existing sources on air quality related values for Class I areas in several regions of the country. In the 1980s I managed a series of model evaluation studies for EPA's Office of Air Quality Planning and Standards that contributed to the development of the Guideline on Air Quality Models, and I also oversaw development of the statistical methodology for the Plume Model Validation and Development Project sponsored by the Electric Power Research Institute. My undergraduate and graduate degrees are in physics, with an emphasis on modeling and statistics.
In short, I suppose in conventional parlance, I would be considered a modeling expert. I'm comfortable with models. I respect what models can do. I use models all the time. But I also learned as an undergraduate to test models and to understand their limitations in order to interpret what they're telling us. And I think that's the bottom line of the issues that I -- and concerns that I would express today.
My testimony will address the selection of the model and modeling approach by the Department

Page 559

and by EPA Region 8, the limited performance evaluation by the Department, recommended additional testing of the model, and the role of model bias in EPA increment predictions.
The Department of Health and EPA Region 8 selected the Calpuff model to assess SO2 increment consumption for Class I areas in western North Dakota and eastern Montana. The proposed model application involves impact assessment for source-receptor distances ranging from a few kilometers up to about 300 kilometers. Federal guidance relating to air quality modeling distinguishes between near field and long-range transport applications. A cutoff distance of 50 kilometers is used to delineate the maximum distance at which near field techniques should be used. The present Class I increment application is clearly in the long-range transport category.
The Calpuff model was proposed by the EPA Office of Air Quality Planning and Standards at the Seventh Modeling Conference as the recommended model for long-range transport applications. The Interagency Workgroup on Air Quality Modeling, or IWAQM as you have been hearing for a few days, and the Federal Land Managers Air Quality Related

Page 560

Values Workgroup, known as FLAG, have also recommended the Calpuff modeling system for these types of applications. These agencies have found that Calpuff contain state-of-the-art science and generally performs well when applied -- when it is applied in the appropriate manner. Such proposed rules and workgroup advice, however, do not constitute agency guidance with respect to prevention of significant deterioration.
Under the Clean Air Act Congress required that EPA, quote, specify with reasonable particularity each air quality model or models to be used under specified sets of conditions for purposes of PSD, unquote. To meet this requirement, EPA has set forth approved models in its Guideline on Air Quality Models, 40 CFR, Part 51, Appendix W. As noted by a number of other speakers, there is no long-range transport model currently recommended in EPA's Guideline. Calpuff is not yet an approved guideline model.
For the Class I increment analysis, Calmet and Calpuff were applied by the Department and EPA Region 8 with a 10-kilometer horizontal grid scale for an area that extends 640 kilometers east-west by 460 kilometers north-south. For Calmet, the

Page 561

meteorological inputs supplied to the model for the 2002 -- as recorded in the 2002 reports include hourly surface measurements from 25 stations located in or near the modeling grid, plus twice daily upper air measurements from six stations, only two inside of the modeling domain. Precipitation data from 96 observing stations located in or near the modeling grid were used to define precipitation.

Calpuff is a nonsteady-state modeling system that includes meteorological and geophysical data processors, a meteorological model, a puff-based dispersion model and post-processing models as depicted in the chart, which probably is tough for almost any of us to see, but I think you gather both the complexity of the overall modeling system. And what's listed in the boxes on the left-hand side of that chart are the types of inputs that go into the -- in terms of model options that are specified both for Calmet and Calpuff. As the developers of Calpuff and Calmet, Earth Tech is thoroughly familiar with the choices of options and inputs that confront the user and how those choices can influence model predictions.

The application of Calmet and Calpuff by

Page 562

the Department and EPA Region 8 for the Class I increment study did not consistently follow the recommendations of EPA OAQPS as they proposed the model for the guideline and as was discussed by Mr. Paine yesterday. Also, as Mr. Paine pointed out, those recommendations are, themselves, evolving in response to comment received when the model was proposed.

The Department and EPA reports indicate that technical decisions relating to options and parameter settings were made primarily by the Department based on a limited model performance/ sensitivity study. EPA Region 8 then adopted the approach selected by the Department, but also ran Calpuff with the so-called IWAQM settings recommended in EPA's proposed rules.

When using observations to select model parameters and options to improve model performance, it is important to recognize the limitations of available measurements, and precautions should be taken to avoid what I refer to as model tuning, which really amounts to calibration of the model by a sensitivity testing, which serves to achieve apparent agreement between predictions and observations, but may not in fact

Page 563

improve the technical performance of the model.

Available documentation indicates that neither the Department nor EPA Region 8 prepared an adequate modeling protocol for the increment consumption analysis. A modeling protocol that defines the proposed modeling approach, including any planned model performance testing, and which addresses the technical and regulatory issues pertinent to the proposed application, represents the most effective mechanism to ensure that the modeling approach is technically sound and consistent with regulatory guidance. It also provides a control mechanism to document that the modeling approach has been defined in advance based on technical and regulatory criteria and was not modified for convenience to achieve desired results.

We certainly recognize the complicated circumstances as this modeling has evolved, and we recognize that the Class I increment modeling for North Dakota and eastern Montana has had a rather turbulent and somewhat circuitous history. The EPA Region 8 modeling approach is based on the Department's 2001 modeling study, which evolved out of the earlier Department 1999 modeling study. The

Page 564

Department's 2001 approach is based on the Department's model performance assessment. The Department did prepare a protocol in 2000 in anticipation of the 2001 application of Calpuff, but that fairly cursory protocol made no provision for a performance assessment study and was ultimately -- after it was rejected by EPA Region 8, the.

Department went off on a somewhat different tact. No planning document for any model evaluation study has been released by either agency, and results have only been published for the -- performance results have only been published for the final model configuration that was selected by the Department. Aside from a few alternatives that were -- excuse me. Aside from a few remarks about model performance using IWAQM settings, no description of the alternatives that were evaluated, the sensitivity of model predictions to different options and parameter settings, or model performance results for any tested alternatives have been released by either agency. Comments by EPA's Office of Air Quality Planning and Standards on the modeling performed by EPA Region 8, as documented in one of the memos that was provided